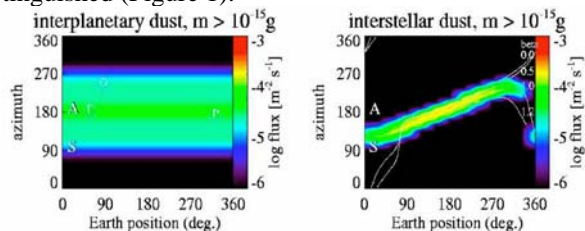


**DUST TELESCOPE ON THE LUNAR SURFACE.** Eberhard Grün<sup>1,2</sup>, Mihaly Horanyi<sup>1,3</sup>, Siegfried Auer<sup>4</sup>, Scott Robertson<sup>3</sup>, Ralf Srama<sup>2</sup>, Zoltan Sternovsky<sup>1</sup> (<sup>1</sup>Laboratory for Atmospheric and Space Physics, U. of Colorado, Boulder, CO 80309-0392, e-mail: [Eberhard.Grun@lasp.colorado.edu](mailto:Eberhard.Grun@lasp.colorado.edu); <sup>2</sup>Max Planck Institute for Nuclear Physics, D-69117 Heidelberg, Germany; <sup>3</sup>Department of Physics, U. of Colorado, Boulder, CO 80309; 4A&M Associates P.O. Box 421, Basye, Virginia 22810)

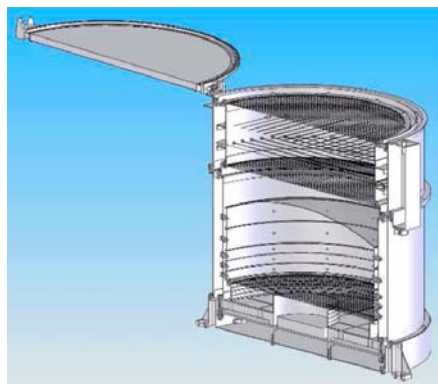
The moon exhibit a variety of dusty phenomena: The surface is battered by high-speed interplanetary micrometeoroids and interstellar dust particles, high-energy ejecta particles escape the gravitational field of the moon or add to the impactor flux, and surface charging by ambient plasma effects are suggested to lead to electrostatic levitation and transport of lunar dust. The lunar surface provides an ideal platform to investigate these interplanetary, interstellar, and local lunar dust phenomena. A state-of-the-art dust telescope will (1) provide the distinction between interstellar dust and interplanetary dust of cometary and asteroidal origin, (2) determine the elemental composition of impacting dust particles, and (3) monitor the fluxes of various dust components as a function of direction and particle masses.

A dust telescope on the lunar surface consists of a dust trajectory sensor and a large-area mass analyzer, and an electrostatic lunar dust analyzer. Trajectory sensors use the electric charge signals that are induced when charged grains fly through the detector [1]. By accurately sensing their trajectories dust from various interplanetary and interstellar sources is reliably distinguished (Figure 1).

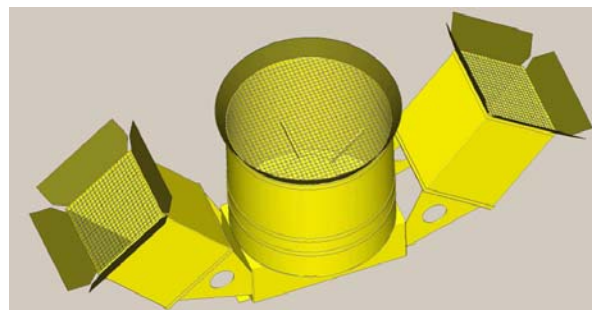


**Figure 1:** The direction of interplanetary (left) and interstellar grains (right) through the year. The azimuth of 90° is the direction of the Sun, and 180° is the orbital motion of the Earth.

The large-area mass analyzer (Figure 2 and 3) consists of a high resolution time-of-flight mass spectrometer and measures the elemental and isotopic composition of the ions released during the high-speed impacts of dust particles [2]. This dust telescope is complemented by an electrostatic lunar dust analyzer which measures dust trajectories, charges and masses, in order to characterize the mobilized lunar fines. By use of pick-up detectors in combination with electrostatic deflectors the migration of low-velocity charged grains can be analyzed on the surface of the moon.



**Figure 2:** Dust telescope (DT) dedicated to the mass, velocity vector, charge, chemical and isotopic measurements of interplanetary and interstellar grains.



**Figure 3:** The Dust Telescope (as in Figure 1) and the complementary sensors dedicated to slow moving lunar dust that is expected to be lofted and mobilized by plasma effects.

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